

JC639 U.S. PTO
09/656440
09/06/00

Docket No.: 48864-030

UTILITY PATENT APPLICATION
UNDER 37 CFR 1.53(b)

Box PATENT APPLICATION
Assistant Commissioner for Patents
Washington, DC 20231
Sir:

Transmitted herewith for filing is the patent application of:

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TSUBOI, Daisetsu TOHYAMA
FOR: IMAGE PROCESSING APPARATUS

Enclosed are:

- ☒ 10 pages of specification, claims, abstract.
- ☒ Declaration and Power of Attorney.
- ☒ Priority Claimed.
- ☒ Certified copy of Japanese Patent Application No. 11-256856
- ☒ 3 sheets of formal drawing.
- ☒ An assignment of the invention to MINOLTA CO., LTD.
and the assignment recordation fee.
- ☐ An associate power of attorney.
- ☐ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.
- ☒ Information Disclosure Statement, Form PTO-1449 and reference.
- ☒ Return Receipt Postcard
- ☐

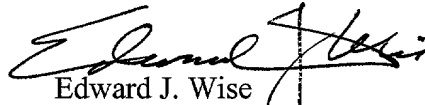
The filing fee has been calculated as shown below:

	NO. OF CLAIMS		EXTRA CLAIMS	RATE	AMOUNT
Total Claims	10	-20	0	\$18.00	\$0.00
Independent Claims	2	-3	0	\$78.00	\$0.00
Multiple Dependent Claim(s)					\$0.00
Basic Fee					\$690.00
Total of Above Calculations					\$690.00
Less ½ for Small Entity					\$0.00
Assignment & Recording Fee					\$40.00
Total Fee					\$730.00

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Respectfully submitted,

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20277

PATENT TRADEMARK OFFICE

IMAGE PROCESSING APPARATUS

This application is based on Japanese Patent Application No. 256856/1999 filed on September 10, 1999, the contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an image processing apparatus for outputting an image by a printer or a display.

2. Description of the prior art

When printing out an image read by a color scanner or a computer graphics, a color compressing process is performed as necessary, in which colors of the image data are converted into colors within a color reproduction range of the printer.

Conventionally, it is decided whether a color compression process is necessary or not for each page, and a color compressing process is performed for the pages that require the color compression in accordance with the decision result.

For example, concerning copies of plural color originals, the color compression is performed for some originals, while it is not performed for other originals. In this case, there was a problem that the states of color reproduction of copies are not uniform among the originals. It is considered to decide whether the color compression is necessary or not for the first original, and to adopt the decision result to all of the originals. In this case, the color compression cannot be performed for originals that need the color compression. In general, if the color compression is not performed for originals that need the

color compression, the influence is larger than the case where the color compression is performed for originals that do not need the color compression.

SUMMARY OF THE INVENTION

The object of the present invention is to make the color reproducibility uniform in the image output of plural pages.

An image processing apparatus according to the present invention comprises a decision controller for deciding whether plural pages of image data included in the job are data within a color reproduction range of the output device or not, and a color compressing controller for performing a color compression process uniformly to all of the plural pages of image data in accordance with the decision of the decision controller so as to supply the processed data to the output device.

An image processing method according to the present invention comprises a decision step of deciding whether plural pages of image data included in the job are data within a color reproduction range of the output device or not, and a color compression step of performing a color compression process uniformly to all of the plural pages of image data in accordance with a decision in the decision step so as to supply the processed data to the output device.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing a general structure of an image output system according to the present invention.

Fig. 2 is a schematic diagram of the color compression.

Fig. 3 is a flow chart showing a general operation of the color conversion device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, the present invention will be explained more in detail with reference to embodiments and drawings.

5 Fig. 1 is a block diagram showing a general structure of an image output system according to the present invention.

 The image output system 1 comprises a scanner 10 that reads an original by decomposing its color into three colors, i.e., red (R), green (G) and blue (B), a print engine 20 that prints a color image, a color conversion device 100 and a computer 15
10 that issues a print job. More specifically, the image output system 1 can take the form of a computer system including a color printer with a print engine 20 and an image reader with a scanner 10, or a combination machine thereof. The image
15 output system 1 is used for printing a document generated by the computer 15 or for copying the original. The color conversion device 100 is built in the color printer or the image reader. Otherwise, it is used as a stand-alone apparatus connected by a cable.

20 In a copying operation of plural originals, the scanner 10 reads sequentially the plural originals set on a table of original and sends the image data to the color conversion device 100. The computer 15 sends the image data to a color conversion device 100, when printing plural pages of a document.

25 An input interface 103 of the color conversion device 100 selects the scanner 10 or the computer 15 as an input device and sends image data D1 from the input device to an image memory 104. The image memory 104 memorizes all image data D1 concerning one output job (a copy job or a print job). In
30 parallel with this memorizing process, the image data D1 of each

page are sent from the image memory 104 to a color space
decision portion 106 sequentially. The color space decision
portion 106 is supplied with data that show the current printer
color reproduction range r0 from a printer color space memory
5 portion 107.

The color space decision portion 106 decides whether a
color range of the image data D1 of each page exceeds the
printer color reproduction range r0 or not. The detail of the
decision process will be described later. In accordance with
10 the decision result Dj, a CPU 109 sets a parameter Dp that
defines contents of the process for an image processing portion
105. The image processing portion 105 can perform a color
conversion from RGB to CMYK, an image quality improving
process such as a γ correction or an edge emphasis and a color
15 compression process for the image data D1 that were read out of
the image memory 104. The image data D2 after the image
processing are sent to the print engine 20.

Since the CPU 109 sets the parameter for each job, the
color compression is not performed for the image data D1 of all
20 pages of one job, or the color compression is performed for the
image data D1 over all pages of one job. However, it is
possible to provide an input key to a display portion 108 for
displaying a state, so that a user can designate necessity or not
necessity of the color compression for each page.

25 Fig. 2 is a schematic diagram of the color compression.

The above-mentioned color space decision portion 106
converts the RGB image data D1 to a standard color space (e.g.,
a CIELAB color space) data and decides whether the pixel color
of each page is a color within the printer color reproduction
30 range r0 or not for each of a predetermined number (six in this

example) of blocks q1-q6 of the standard color space Q that was divided by the tint. Then, the color space decision portion 106 sends the data that indicate the ratio of the number of the pixels outside the printer color reproduction range to that of each of the blocks q1-q6 (the ratio of areas) as the decision result Dj to the CPU 109. The CPU 109 memorizes the decision result Dj that was sent page by page, decides necessity or not necessity of the color compression for each block in accordance with the decision result Dj of one job, and calculates the parameter Dp, which is given to the image processing portion 105. In the example of Fig. 2, the color range r1 of the first page is out of the printer color reproduction range r0 in the block q1. In addition, the color range r2 of the second page is out of the printer color reproduction range r0 in the blocks q3 and q4. In this case, the image processing portion 105 performs the color compression for converting the color of the portion corresponding to the block q1 of the image data D1 of the first page into the color within the printer color reproduction range r0 as shown by the arrows in the figure, and performs the color compression for the blocks q3 and q4, too. In the same way, the image processing portion 105 performs the color compression of the image data D1 of the second page for the blocks q3 and q4 and performs the color compression for the block q1, too.

Fig. 3 is a flow chart showing a general operation of the color conversion device.

After analyzing a fetch mode and printer information in accordance with a communication result with the input device and the output device, fetching of the image data from the input device is started (#1, #2). Concerning the image data of one page, the above-mentioned area ratio is calculated for each block

of the color space (#3, #4). The area ratio is calculated for the image data of all pages of one job (#5), necessity or not necessity of the color compression is decided for each block in accordance with the cumulative value of the area ratio of all
5 pages (#6), a parameter for adding a necessary image process to the image data D1 is set (#7), and the image process is started for outputting the image data D2 (#8).

In the above-mentioned embodiment, the kind and the number of the input device and the output device are not limited
10 to the illustrated example. In the case of plural output devices, it can be possible that the user selects one output device by the display portion 108. The division number of the color space Q is not limited to six. It is possible to decide necessity or not necessity of the color compression without dividing the color
15 space Q.

According to the present invention, the color reproducibility in the image output of plural pages can be made uniform.

While the presently preferred embodiments of the present
20 invention have been shown and described, it will be understood that the present invention is not limited thereto, and that various changes and modifications may be made by those skilled in the art without departing from the scope of the invention as set forth in the appended claims.

What is claimed is:

1. An image processing apparatus for processing plural
pages of a job to be given to an output device, the image
5 processing apparatus comprising:

a decision controller for deciding whether plural pages of
image data included in the job are data within a color
reproduction range of the output device or not; and

a color compressing controller for performing a color
10 compression process uniformly to all of the plural pages of
image data in accordance with the decision of the decision
controller so as to supply the processed data to the output device.

2. The image processing apparatus according to claim 1,
wherein the decision controller performs the decision for each of
15 the plural pages, and the color compressing controller
determines a parameter to be used for the color compression by
integrating the decision result of the decision controller about
the all pages.

3. The image processing apparatus according to claim 2,
20 wherein the decision controller performs the decision for each of
the sections of a color space, and the compressing controller
performs the color compression for each of the sections.

4. The image processing apparatus according to claim 1,
wherein the decision controller performs the decision for each of
25 the sections of a color space, and the compressing controller
performs the color compression for each of the sections.

5. The image processing apparatus according to claim 1,
wherein the output device is a printer for printing an image in
accordance with the image data, and the image processing
30 apparatus is built in the printer.

6. The image processing apparatus according to claim 1, wherein the image data are generated by an image reader, and the image processing apparatus is built in the image reader.

7. An image processing method for processing plural
5 pages of a job to be given to an output device, the method comprising:

a decision step of deciding whether plural pages of image data included in the job are data within a color reproduction range of the output device or not; and

10 a color compression step of performing a color compression process uniformly to all of the plural pages of image data in accordance with a decision in the decision step so as to supply the processed data to the output device.

8. The image processing method according to claim 7,
15 wherein the decision step includes a page decision step of deciding whether the image data of each page are data within a color reproduction range of the output device or not and a step of repeating the page decision step over all of the pages, and the color compression step includes a determining step of
20 determining a parameter to be used for the color compression by integrating the decision result in the decision step about the all pages and a step of performing the color compression uniformly to all pages using the parameter that was determined in the determining step.

25 9. The image processing method according to claim 8, wherein the decision is performed in the decision step for each of the sections of the color space, and the color compression is performed in the compression step for each of the sections.

10. The image processing method according to claim 7,
30 wherein the decision is performed in the decision step for each

of the sections of the color space, and the color compression is performed in the compression step for each of the sections.

ABSTRACT OF THE DISCLOSURE

An image processing apparatus for outputting an image by a printer or a display is provided, in which color
5 reproducibility in the image output of plural pages becomes uniform. The apparatus comprises an image memory for memorizing image data of all pages of one output job that is given to an output device, decision portion for deciding whether the image data of all pages are data within a color reproduction
10 range of the output device or not. A color compression process is performed for the image data of all pages uniformly only when it is decided that the image data of all pages are not data within the color reproduction range of the output device.

Fig. 1

1 IMAGE OUTPUT SYSTEM

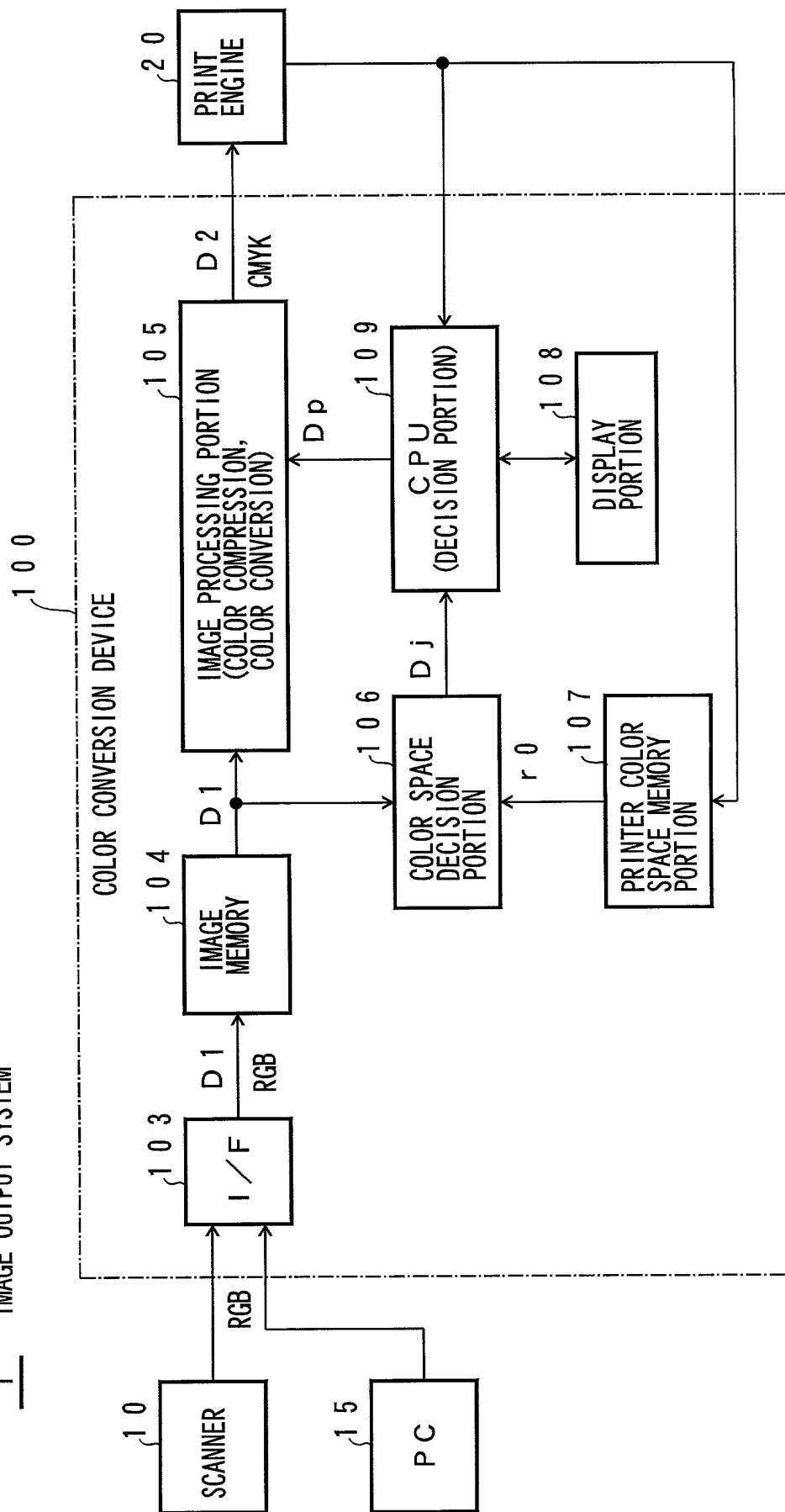


Fig. 2

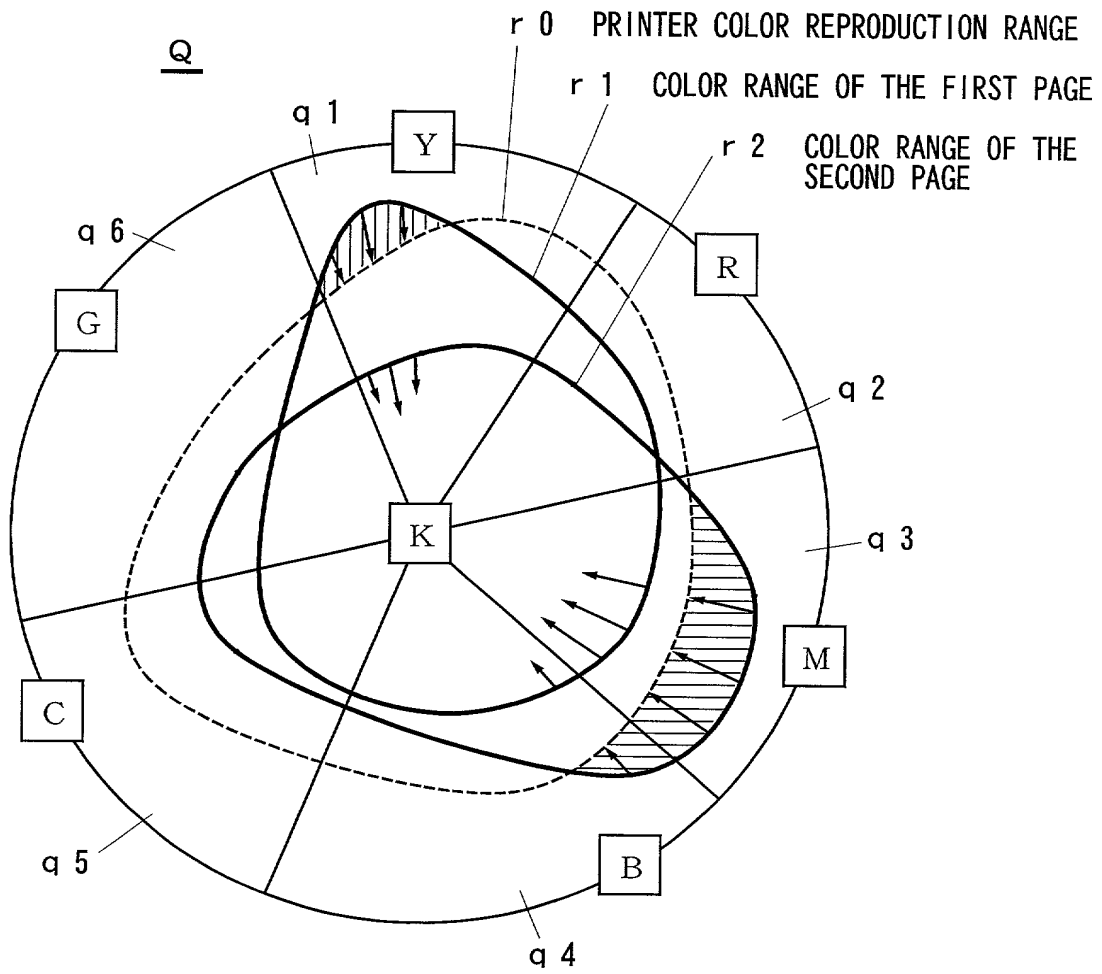
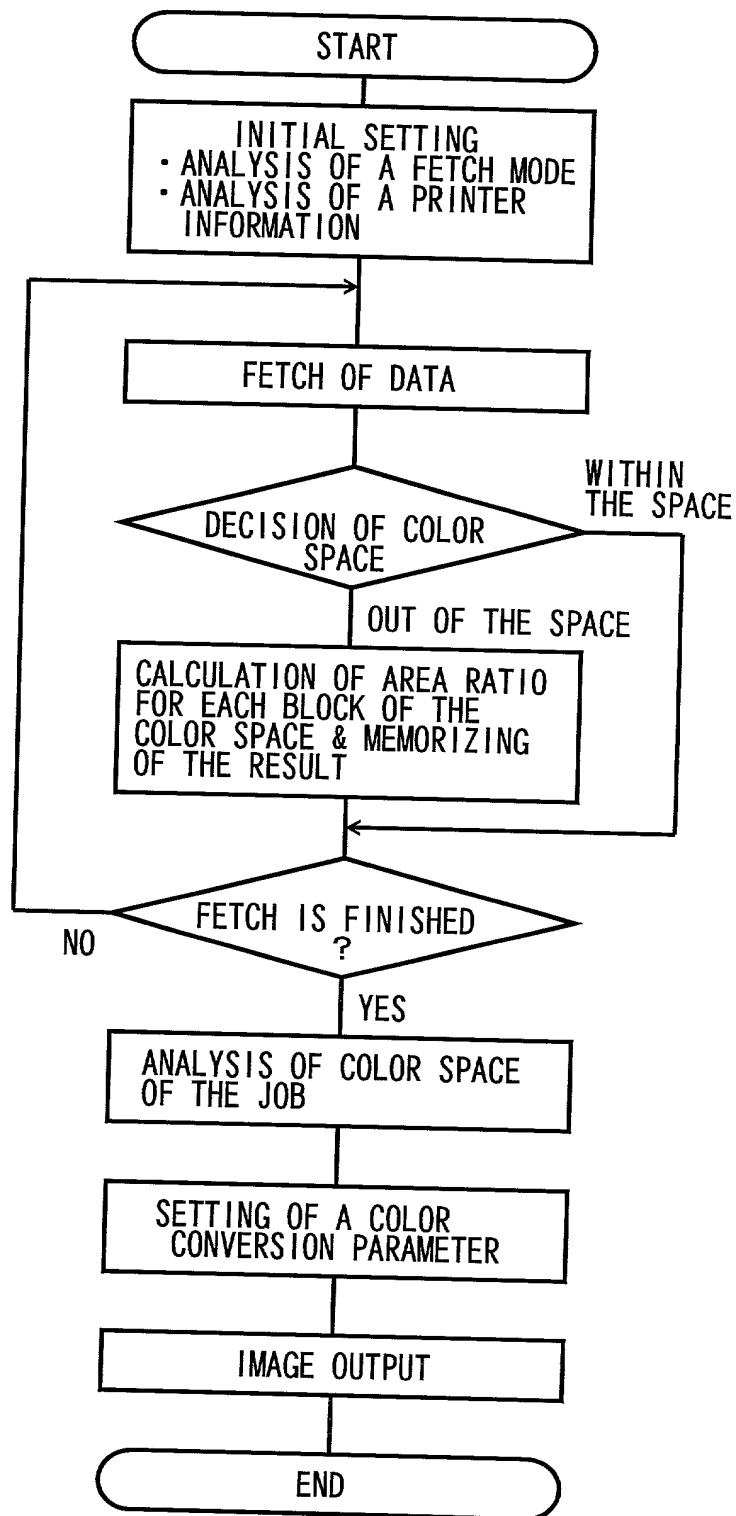


Fig. 3



Attorney Docket No. _____

COMBINED DECLARATION/POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor(s), I(we) hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

IMAGE PROCESSING APPARATUS, the specification of which

(check one) X is attached hereto.

_____ was filed on _____ as
United States Application No.

_____ PCT International Patent Application Number
filed
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed
<u>11-256856</u> (Number)	<u>Japan</u> (Country)	<u>10/September/99</u> (Day/Month/Year Filed)	<u> X </u> Yes <u> </u> No

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

_____ (Appln. Serial No.)	_____ (Filing Date)	(Status-patented, pending, abandoned)
_____ (Appln. Serial No.)	_____ (Filing Date)	(Status-patented, pending, abandoned)

I hereby appoint as my attorneys, with full power of substitution and revocation, to prosecute the patent application identified above and to transact all business in the U.S. Patent and Trademark Office connected therewith: Edward A. Becker, Reg. No. 37,777; Stephen A. Becker, Reg. No. 26,527; Marcel K. Bingham, Reg. No. 42,327; John G. Bisbikis, Reg. No. 37,095; Daniel Bucca, Reg. No. 42,368; Kenneth L. Cage, Reg. No. 26,151; Stephen C. Carlson, Reg. No. 39,929; Tom A. Corrado, Reg. No. 42,439; Paul Devinsky, Reg. No. 28,553; Laura A. Donnelly, Reg. No. 38,435; Margaret M. Duncan, Reg. No. 30,879; Brian E. Ferguson, Reg. No. 36,801; Michael F. Fogarty, Reg. No. 36,139; Willem F. Gadiano, Reg. No. 37,136; Keith E. George, Reg. No. 34,111; John A. Hankins, Reg. No. 32,029; Brian D. Hickman, Reg. No. 35,894; Eric J. Kraus, Reg. No. 36,190; Patrick B. Law, Reg. No. 41,549; Robert E. LeBlanc, Reg. No. 17,219; Jack Q. Lever, Reg. No. 28,149; Raphael V. Lupo, Reg. No. 28,363; Christine F. Martin, Reg. No. 39,762; Michael A. Messina, Reg. No. 33,424; Eugene J. Molinelli, Reg. No. 42,901; Christopher J. Palermo, Reg. No. 42,056; Joseph H. Paquin, Jr., Reg. No. 31,647; Robert L. Price, Reg. No. 22,685; Gene Z. Robinson, Reg. No. 33,351; Joy Ann G. Serauskas, Reg. No. 27,952; David A. Spenard, Reg. No. 37,449; Arthur J. Steiner, Reg. No. 26,106; David L. Stewart, Reg. No. 37,578; Michael D. Switzer, Reg. No. 39,552; Leonid D. Thenor, Reg. No. 39,397; Keith J. Townsend, Reg. No. 40,358; Aaron Weisstuch, Reg. No. P41,557; Edward J. Wise, Reg. No. 34,523; Alexander V. Yampolsky, Reg. No. 36,324; and Robert W. Zelnick, Reg. No. 36,976 all of

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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